3

Eucalyptus calophylla var. *maideniana* Hochr.: A Male Tree

By Stella G. M. Carr* and D. J. Carr*

Abstract: As previously predicted, *E. calophylla* var. *maideniana* is shown to consist of material collected from an apparently male tree of that species.

Some species of series *Corymbosae* (Benth.) Maiden, (bloodwoods), including *E. calophylla* (R. Br.) ex Lindl., *E. ficifolia* F. Muell., and *E. haematoxylon* Maiden have recently been shown to produce 'male flowers' (Carr, Carr and Ross 1971) (see footnote). In its extreme form, the male flower of these eucalypts is sub-spherical or top-shaped due to almost complete failure of the ovary to develop. Examination of material from trees which habitually set few fruits showed that even flowers of an apparently normal shape may be functionally male, due to late failure of ovule or embryo sac development. Some trees of *E. calophylla* appear to bear only male flowers and set either no fruits or a few which are aberrant in shape or contain no seeds. From its description we suggested (Carr, Carr and Ross, loc. cit.) that *E. calophylla* var. *maideniana* Hochr. might have been based on material collected from such a male tree. At that time the type material was not available to us for inspection but it has since been sent on loan by courtesy of the Curator of the Boissier Herbarium in Geneva. In the meantime, Pryor and Johnson (1971) have synonymized the variety with *E. haematoxylon* without, it would appear, an examination of the type material.

One sheet of the type is illustrated in Fig. 1. The shape of the buds indicates that all are male (compare Fig. 2 with Figs. 1-7 of Carr, Carr and Ross 1971). Longitudinal (Fig. 7) and transverse (Fig. 3) sections of a typical flower bud confirm that the ovary is completely abortive. Ovulodes are incompletely developed and the ovules are typically collapsed (Fig. 9). The tree from which the type material was collected bore no fruits (Hochreutiner 1924-26). Although taxonomically the variety cannot be maintained, Hochreutiner's specimen is of interest as the first record of a male tree of *E. calophylla*. Unlike the specimens described in Carr, Carr and Ross (loc. cit.) all of the flowers of the type specimen are of the extreme male type, with little or no development of the ovary. The flowers of the type specimen differ in a number of respects from the extreme male flowers described by Carr, Carr and Ross. They have relatively long pedicels, a considerable development of the duct system of the ovary wall (Figs. 3, 4 and 8), a normal development of the large central cavity (traversed by frayed strands of parenchyma), of the style (Fig. 5), and a well-developed compitum (Fig. 8). These are all features well shown in bisexual flowers and in superficially bisexual flowers rendered male by collapse of the ovules at an early or late stage in embryo sac development (cf. Fig. 10 of Carr, Carr and Ross 1971). However, it is clear that in the Hochreutiner specimen completeness of anatomical development is not related to the shape of the flower. The nectary and stamens of these male flowers are always normally developed and the pollen appears normal (Fig. 6).

E. calophylla, E. ficifolia and *E. haematoxylon* are all confined to the south-west province of Western Australia. They appear to be closely related. Herbarium specimens or trees in cultivation are not readily identifiable to the species. *E. calophylla* and *E. ficifolia* are vicarious. It has recently been shown that the latter is more susceptible to a soil-borne disease ('stem canker') the causal organism of which occurs in soils which carry stands of *E. calophylla* but is absent from soils on which *E. ficifolia* is native (Smith 1970). There seems no adequate reason to separate *E. ficifolia* from the other two into a special 'subspecies Ficifolinae', as proposed by Pryor and Johnson (1971). In this instance, specific differences in the presence or absence of a wing on the seeds are irrelevant, as was perceived by Bentham

* Research School of Biological Sciences, A.N.U., Canberra, A.C.T. 2601.

(1867) and confirmed by Gauba and Pryor (1961). However, it is useful to note that *E. haematoxylon* differs from the other two species in that the style is inserted in a pit, a character hitherto unrecorded. In *E. calophylla* and *E. ficifolia* the base of the style joins smoothly and squarely to the free surface of the ovary—there is no depression around the base of the style. This is also true of the style of the flower of *E. calophylla* var. *maideniana* (Fig. 8).

Note Added in Proof: Male flowers were reported by G. Bentham (1869: Notes on Myrtaceae. *J. Linn Soc.* (*Bot.*) 10: 101-166) as occurring in 'a number of genera in Leptospermoideae'. S. T. Blake (1968) has also remarked of *Melaleuca leucadendron* that 'some plants produce only male flowers' (A revision of *Melaleuca leucadendron* and its allies (Myrtaceae). *Contrib. from the Queensland Herb.* 1: 1-114).

REFERENCES

Bentham, G., 1867. *Flora Australiensis,* Vol. III. Reeve and Co., London.

Carr, Stella G. M. & Carr, D. J., 1961. The functional significance of syncarpy. *Phytomorphology* 11: 249-256.

———, ——— & Milkovits, Lydia, 1970. Oil ducts and glands in *Eucalyptus* L'Herit. III. The flowers of series *Corymbosae* (Benth.) Maiden. *Aust. J. Bot.* 18: 313-333.

———, ——— & Ross, Frances L., 1971. Male flowers in eucalypts. *Ibid.* 19: 73-83.

Gauba, E. & Pryor, L. D., 1961. Seed coat anatomy and taxonomy in *Eucalyptus*. III. *Proc. Linn. Soc. N.S.W.* 86: 96-111.

Hochreutiner, B. P. G., 1924-1926. *Plantae Hochreutineranae*. II. *Candollea* 2: 317-513.

Pryor, L. D. & Johnson, L. A. S., 1971. *A classification of the Eucalypts*. Canberra, A.N.U. Press.

Smith, W. P. Cass., 1970. Stem canker disease of red flowering gums. *West. Aust. Dep. Agric. Bull. No. 3714* (reprinted from *J. Agric. West. Aust.* 11 (2)).

DESCRIPTION OF PLATE 4

Fig. 1—Type specimen (× 0·5).
Fig. 2—Typical flower bud (× 4·5).
Fig. 3—Transverse section of ovary (× 20). C = cortical oil glands, W = ducts of ovary wall, P = placenta with abortive ovules.
Fig. 4—Longitudinal section of outer portion of the ovary. X = ducts accompanying X bundles (see Carr, Carr and Milkovits 1970). Other lettering as in Fig. 3 (× 50).
Fig. 5—Longitudinal section of mid-region of style, showing the central cavity traversed by strands of parenchyma (× 50).
Fig. 6—Longitudinal section of an anther, showing the content of apparently normal pollen (× 30).
Fig. 7—Median longitudinal section of a typical flower (× 7). The plane of section of Fig. 3 is indicated by an arrow. The portions of the bud sectioned in Figs. 4 and 5 are also indicated.
Fig. 8—Median longitudinal section of the base of the style, showing its smooth, square confluence with the free wall of the ovary. Note the well-developed compitum (=Co) (× 20).
Fig. 9—Longitudinal section of ovary showing a placenta (=P) bearing ovulodes (=Ovd) and a collapsed ovule (=Ov) (× 50).